

CLAIMS

1. A method for making a cross-linked elastomer which comprises compounding a mixture comprising a vulcanizable elastomer, a sulfur source, and Tall Oil Heads (TOH), the TOH comprising 40-90 wt% fatty acids and greater than 10 wt% unsaponifiable materials, and heating the compounded mixture to a temperature sufficient to cause substantial crosslinking of the elastomer.
2. A method for making a cross-linked elastomer which comprises compounding a mixture comprising a vulcanizable elastomer, a sulfur source and from about 0.1% to about 6.0% by weight of Tall Oil Heads (TOH), and heating the compounded mixture to a temperature sufficient to cause substantial crosslinking of the elastomer.
3. A method of enhancing the cure of a sulfur vulcanizable elastomer selected from the group consisting of natural rubber, synthetic rubber or mixture thereof which comprises adding Tall Oil Heads (TOH) to a sulfur vulcanizable elastomer to provide an admixture, and heating the admixture to a temperature sufficient to achieve vulcanization.
4. A method of enhancing the cure of a sulfur vulcanizable elastomer selected from the group consisting of natural rubber, synthetic rubber or mixture thereof which comprises adding a distillation fraction of Tall Oil Heads (TOH) to a sulfur vulcanizable elastomer to provide an admixture, and heating the admixture to a temperature sufficient to achieve vulcanization, where in the distillation fraction comprises at least 50 wt% palmitic acid.
5. The method of claims 1-4 wherein said elastomer is selected from the group consisting of natural rubber, neoprene, polyisoprene, butyl rubber, polybutadiene, styrene-butadiene copolymer, styrene/isoprene/butadiene rubber, methyl methacrylate-butadiene copolymer, isoprene-styrene copolymer, methyl methacrylate-isoprene copolymer, acrylonitrile-isoprene copolymer, acrylonitrile-butadiene copolymer, EPDM and mixtures thereof.
6. The method of claims 1-4 wherein the TOH comprises at least one terpene selected from the group α -pinene, β -pinene, camphene, 3-carene, and 1-terpineol.
7. The method of claims 1-4 wherein the TOH comprises at least one hydrocarbon selected from β -cadinene and retene.
8. The method of claims 1-4 wherein the TOH contains at least 0.2 wt% 3,5-dimethoxystilbene (DMS).

9. The method of claim 1-4 wherein the TOH contains palmitic acid as the predominant fatty acid.
10. The method of claims 1-4 wherein the TOH contains a phenolic material selected from phenol, guaiacol, ethylguaiacol, hydroeugenol, eugenol, *cis*-isoeugenol, *trans*-isoeugenol and acetoguaiacol.
11. The method of claims 1-4 wherein the TOH has an acid number in the range of 100-175.
12. The method of claims 1-4 wherein 95 wt% of the TOH has a boiling point of less than about 223°C at 8-12 mm Hg pressure.
13. The method of claim 4 wherein the distillation fraction from TOH has a palmitic acid content of at least 75 wt%.
14. The method of claim 4 wherein the distillation fraction from TOH has an acid number within the range of 150-220.
15. A compounded mixture for preparing a cross-linked elastomer, the mixture comprising a vulcanizable elastomer, a sulfur source, and Tall Oil Heads (TOH), the TOH comprising unsaponifiables and fatty acids where the weight of the unsaponifiable fraction exceeds 10% based on the total weight of the TOH.
16. A compounded mixture for preparing a cross-linked elastomer, the mixture comprising a vulcanizable elastomer, a sulfur source, and a distillation fraction from Tall Oil Heads (TOH), the TOH comprising unsaponifiable materials and fatty acids where the weight of the unsaponifiable fraction exceeds 10% based on the total weight of the TOH.
17. The mixture of claims 15 or 16 wherein said elastomer is selected from the group consisting of natural rubber, neoprene, polyisoprene, butyl rubber, polybutadiene, styrene-butadiene copolymer, styrene/isoprene/butadiene rubber, methyl methacrylate-butadiene copolymer, isoprene-styrene copolymer, methyl methacrylate-isoprene copolymer, acrylonitrile-isoprene copolymer, acrylonitrile-butadiene copolymer, EPDM and mixtures thereof.
18. The mixture of claims 15 or 16 wherein the TOH comprises at least one terpene selected from the group α -pinene, β -pinene, camphene, 3-carene, and 1-terpineol.

19. The mixture of claims 15 or 16 wherein the TOH comprises at least 0.2% 3,5-dimethoxystilbene (DMS).

20. The mixture of claims 15 or 16 wherein the TOH contains palmitic acid as the predominant fatty acid.

21. The mixture of claim 16 wherein the distillation fraction from TOH contains at least 50% palmitic acid based on the total weight of the distillation fraction.

22. The mixture of claim 16 wherein the distillation fraction from TOH has a palmitic acid content of at least 75 wt%.

23. The mixture of claims 15 or 16 wherein the TOH has an acid number in the range of 100-175.

24. The mixture of claims 15 or 16 wherein 95 wt% of the TOH has a boiling point of less than about 223°C at 8-12 mm Hg pressure.

25. The mixture of claim 16 wherein the distillation fraction from TOH has an acid number within the range of 150-220.

26. An article of manufacture selected from the group consisting of a tire, belt and hose and comprising a rubber composition prepared by a method of processing a rubber composition which includes thermomechanically mixing at a rubber temperature in a range of 140°C to 190°C for a mixing time of 1 to 20 minutes

(i) 100 parts by weight of at least one sulfur vulcanizable elastomer selected from conjugated diene homopolymers and copolymers and from copolymers of at least one conjugated diene and aromatic vinyl compound;

(ii) about 0.1 to about 6.0% by weight of Tall Oil Heads (TOH).

27. A vulcanized rubber composition comprising a sulfur-vulcanized rubber and the vulcanization reaction product from 0.1 to about 6.0 weight percent of TOH.

28. The rubber composition of claim 27 wherein said rubber is selected from the group consisting of a natural rubber and synthetic elastomer selected from conjugated diene homopolymers and copolymers and from copolymers of at least one conjugated diene and aromatic vinyl compound.